# KEENLEYSIDE GENERATION PROJECT

# HERITAGE RESOURCE

# DETAILED IMPACT ASSESSMENT

Prepared for

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

555 West Hastings Street
Vancouver, British Columbia

by

James Baker

Okanagan College
1000 KLO Road
Kelowna, B.C.

December, 1982

85-0639/

**Canadian Cataloguing in Publication Data**

Baker, James W. E.
Keenleyside generation project : heritage resource : detailed impact assessment

Includes bibliographical references.
ISBN 0-7726-0075-9

1. Columbia River - Power utilization - Environmental aspects - British Columbia - Central Kootenay. 2. Central Kootenay (B.C.) - Antiquities. 3. Historic sites - British Columbia - Central Kootenay. 4. Keenleyside Powerplant Project. I. B.C. Hydro. II. Okanagan College. III. Title.

FC3845.K7A38 1984 333.91'4 C84-092141-1
F1089.K7B35 1984

B.C. HYDRO

This impact assessment is based on the "Keenleyside Powerplant Project Engineering Description" prepared in November 1982. Since that time, ongoing planning and design studies have resulted in some changes that would affect the project description. The principal changes are as follows:

- In-service date has changed from 1992 to 1994 and the optional in-service date of 1990 is no longer being considered.

- Installed capacity has changed from 210 MW to 180 MW with corresponding changes to powerhouse design.

The above changes have been incorporated in the report only where they would affect the results of the impact assessment.

KEENLEYSIDE GENERATION PROJECT

Heritage Resource
Detailed Impact Assessment

CONTENTS


| Section | Subject | Page |
|---|---|---|
| | Summary | i |
| 1.0 | Introduction | 1-1 |
| 1.1 | Objectives and Scope of Heritage Resource Study | 1-1 |
| 1.2 | Heritage Resource Study Personnel | 1-2 |
| 1.3 | Heritage Study and Duration | 1-2 |
| 2.0 | Proposed Project | 2-1 |
| 2.1 | Ancillary Activities | 2-1 |
| 2.2 | Project Schedule | 2-1 |
| 3.0 | Project Area | 3-1 |
| 3.1 | Natural and Cultural Aspects | 3-1 |
| 3.2 | Previous Construction Activity | 3-2 |
| 4.0 | Methodology | 4-1 |
| 5.0 | Resource Evaluation | 5-1 |
| 6.0 | Impact Identification and Assessment | 6-1 |
| 6.1 | Schedule of Proposed Construction Activities | 6-1 |
| 7.0 | Discussion of Research | 7-1 |
| 7.1 | Suitability and Reliability of Testing Program | 7-1 |
| 8.0 | Recommendations | 8-1 |
| 9.0 | References Cited | 9-1 |

List of Figures


| Figure Number | Subject |
|---|---|
| 1-1 | Keenleyside Powerplant Project Location |
| 1-2 | Potential Areas for Construction Facilities |

## SUMMARY

A heritage resource detailed impact assessment study was conducted in the area of the proposed Keenleyside Dam Generation Project.

Five potential heritage resource areas were intensively investigated on the north side of the Columbia River in the proposed project area.

No heritage resources were identified as a result of this study. Previous construction activity in the area has resulted in considerable land surface modification. Heritage sites previously recorded, could not be relocated.

Conservation, compensation or mitigation procedures are not necessary as heritage resource values are not endangered by the proposed project.

A program of monitoring construction activities is recommended for the areas where major land alteration is anticipated. Monitoring will not be required until start of construction of the proposed project.

## 1.0 Introduction

The British Columbia Hydro and Power Authority proposes to construct a generation plant at the Hugh Keenleyside Dam northwest of the City of Castlegar on the Columbia River (Figure 1-1). This project entails land alteration activities in the form of a concrete aggregate borrow area upstream from the existing dam, generation plant construction at the dam site and camp construction immediately downstream from the existing dam, all on the north side of the Columbia River (Figure 1-2).

## 1.1 Objectives and Scope of Heritage Resource Study

A detailed impact assessment study of the potential heritage resource base in the Keenleyside area was contracted in September, 1982 between B.C. Hydro and Okanagan College.

The preliminary overview study of the Keenleyside area was carried out by Bjorn Simonsen in April, 1982. As a result of this previous work, recommendations for a detailed impact assessment study were as follows:

1. Additional assessment, including subsurface probing of heritage resource location downstream from proposed powerplant site...

2. Attempt to relocate prehistoric archaeological sites DiQk 1, DiQk 3 and DiQk 4 in the area of the construction camp...

3. Additional heritage assessment work should be carried out in an area adjacent to the Balfour Borrow Area No. 1... (Simonsen, 1982).

The objective of this detailed impact assessment study was to carry out the above recommendations. In addition, the Balfour Borrow Area No. 2 and the concrete aggregate borrow area were subjected to further assessment.

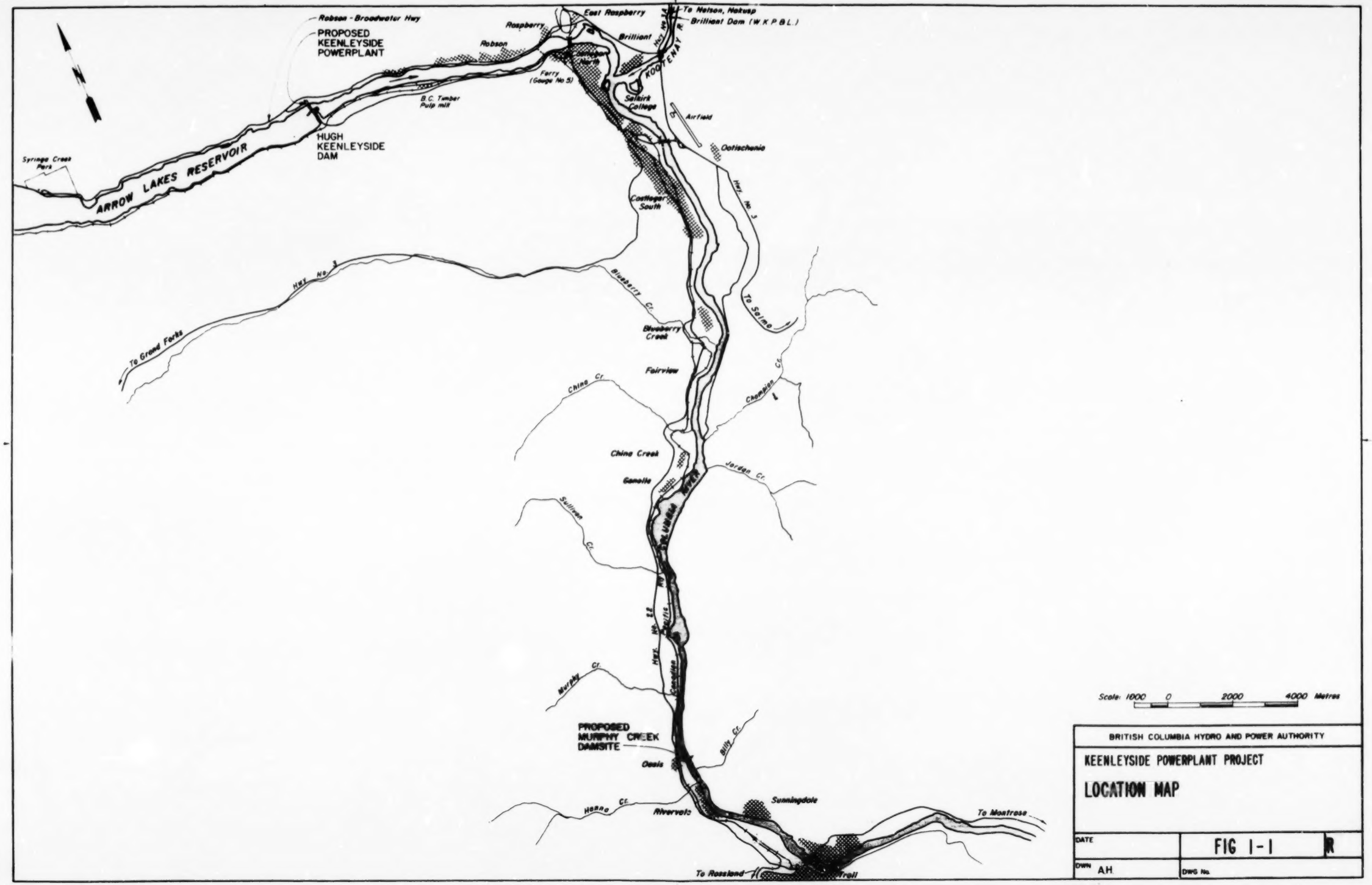
The scope of this detailed impact assessment was to conduct further field work at the proposed locations, evaluate the significance of the resource base, and recommend conservation, mitigation or compensation procedures to be taken in the area.

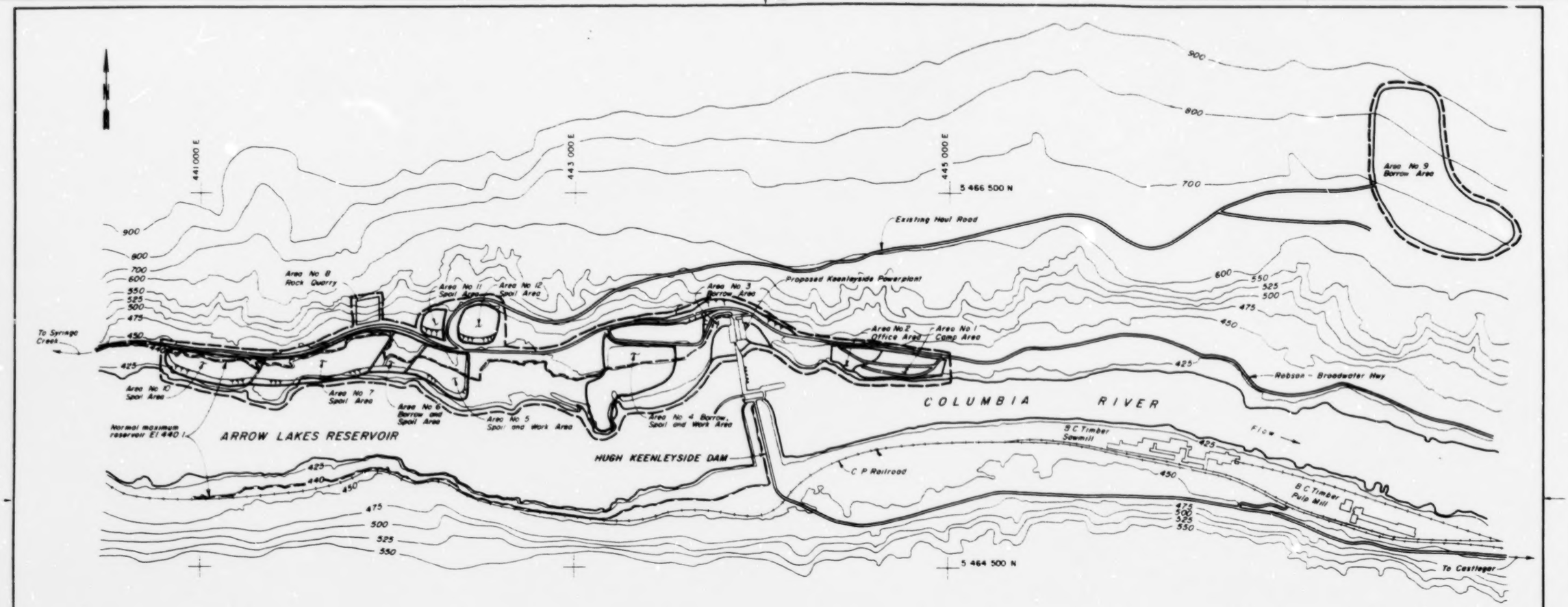
## 1.2 Heritage Resource Study Personnel

James Baker of Okanagan College was the director of this impact assessment study with Kevin McAleese, Lynn Foster and Ian Baker as field personnel.

## 1.3 Heritage Study and Duration

The field work for the detailed assessment study for the proposed Keenleyside Generation Project was done in conjunction with, and as an extension of the field work for the proposed Murphy Creek Project. Minimal assessment was done by the director through the early part of September. Detailed assessment with a total crew of four was done through September 10, 11 & 12, 1982.


Robson - Broadwater Hwy
PROPOSED
KEENLEYSIDE
POWERPLANT
Raspberry
Robson
East Raspberry
Brilliant
To Nelson, Nelway
Brilliant Dam (W.K.P.B.L.)
KOOTENAY R.
Ferry
(Gauge No 5)
B.C. Timber
Pulp mill
Selkirk
College
Airfield
HUGH
KEENLEYSIDE
DAM
ARROW LAKES RESERVOIR
Syringa Creek
Park
Ootischenia
Hwy No 3
Castlegar
South
Hwy No 3
To Grand Forks
Blueberry Cr.
To Salmo
Blueberry
Creek
Fairview
China Cr.
Champion Cr.
China Creek
Genelle
Jordan Cr.
Sullivan
Cr.
Hwy No 22
Kinnaird
Hwy No 22
Cemetery
Murphy Cr.
PROPOSED
MURPHY CREEK
DAMSITE
Billy Cr.
Oasis
Hanna Cr.
Rivervale
Sunningdale
To Montrose
To Rossland
Trail
Scale: 1000 0 2000 4000 Metres
BRITISH COLUMBIA HYDRO AND POWER AUTHORITY
KEENLEYSIDE POWERPLANT PROJECT
LOCATION MAP
DATE
FIG 1-1
R
DWN A.H.
DWG No.


441 000 E
443 000 E
445 000 E
5 466 500 N
5 464 500 N
Area No 9 Borrow Area
Existing Haul Road
Proposed Keenleyside Powerplant
Area No 8 Rock Quarry
Area No 11 Spoil Area
Area No 12 Spoil Area
Area No 3 Borrow Area
Area No 2 Office Area
Area No 1 Camp Area
To Syringa Creek
Area No 10 Spoil Area
Area No 7 Spoil Area
Area No 6 Borrow and Spoil Area
Area No 5 Spoil and Work Area
Area No 4 Borrow, Spoil and Work Area
Normal maximum reservoir El 440 ft
ARROW LAKES RESERVOIR
HUGH KEENLEYSIDE DAM
C P Railroad
COLUMBIA RIVER
Robson - Broadwater Hwy
B C Timber Sawmill
B C Timber Pulp Mill
Flow
To Castlegar
LIMIT OF CONSTRUCTION AREAS
Scale 200 0 200 400 600 800 Metres

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

KEENLEYSIDE POWERPLANT PROJECT

# POTENTIAL AREAS FOR CONSTRUCTION FACILITIES

| | | |
|---|---|---|
| DATE | FIG 1-2 | R |
| DWN SM | DWG No | |

## 2.0 Proposed Project

The proposed Keenleyside Generation Project is located at the Hugh Keenleyside Dam on the Columbia River approximately 9 km upstream from the City of Castlegar (Figure 1-1). The powerplant would be located on the north side of the Columbia River (Figure 1-2) and would generate 210 MW (B.C. Hydro, 1982). Power lines from this proposed project would tie into lines at Murphy or Kootenay Canal (B.C. Hydro, 1982). The impact of these lines on heritage resources has been assessed by Provenance Consultants of Vancouver.

## 2.1 Ancillary Activities

Ancillary activities directly related to this proposed project would be camp construction and concrete aggregate borrow areas. Land alterations can be expected in these proposed areas (Figure 1-2).

## 2.2 Project Schedule

Construction is scheduled to begin early in 1984 with completion by late 1988. Cofferdam, excavation and construction facilities starts will take advantage of the mid-winter low reservoir period (B.C. Hydro, 1982).

## 3.0 Project Area

The general region of the proposed project is situated within the bounds of map coordinates: 49° 20' to 49° 21° North Latitude, and 117° 45' to 117° 47° West Longitude. More specifically the project area covers that part of the north side of the Columbia River from 2 km upstream of the Hugh Keenleyside Dam to 1 km downstream from the dam. The physiography, flora, fauna and cultural events have been reported upon in the Murphy Creek Project reports (Baker, 1981, 1983). A brief summary is provided below.

## 3.1 Natural and Cultural Aspects

The project area falls within the Columbia Mountains division of the Interior Plateau of British Columbia. The overall topography is characterized by mountainous terrain of high relief with narrow river valleys offering the most suitable terrain for habitation (Baker, 1981).

The project area lies in the transition area between Krajina's (1969) Interior Douglas-fir zone and Interior Western Hemlock zone and contains the representative trees and shrubs of those zones (Baker, 1981).

Faunal resources in the project area include most of the large North American game animals such as deer, elk, sheep, goat and bear. At least three species of salmon; sockeye, spring and coho made annual runs up the Columbia River at least as far as the Arrow Lakes (Baker, 1981).

The study area falls entirely within the boundaries of the former territory of the Lakes Salish, a division of the larger Okanagan linguistic group (Baker, 1981). Turnbull (1977) conducted archaeological investigations in the Arrow Lakes before dam construction on the Columbia River. As a result of his work, he described the Lakes Salish as marginal participants of the Plateau Culture of Western North America (Turnbull, 1977:134).

The Plateau Culture Type describes a semi-sedentary people whose subsistence is based on hunting, fishing and gathering. The Lakes Salish economic activities then would consist of root-digging in the spring, fishing and gathering berries in the summer, hunting in the fall and remaining fairly sedentary in permanent villages in the winter.

The more recent history of the project area began with the fur trade period early in the 19th century. Mining activity flourished in the latter part of the 19th century and early part of the 20th century. Agricultural enterprises began in the early part of the 20th century. Enterprises related to the forest industry form the major resource activity in the project area at present (Baker, 1981).

## 3.2 Previous Construction Activity

Construction of the Hugh Keenleyside Dam has had the greatest effect as a source of land alterations in the recent past in the immediate project area. During construction of the Keenleyside Dam in the late 1960s, borrow areas and camp locations were the same for what is proposed for powerplant construction (Simonsen, 1982).

More recent, but less major land alteration has occurred upstream from the dam site where a log dump along the reservoir has been utilized. Considerable recent surface disturbance is visible at this location. The test bores for concrete aggregate have also contributed to surface disturbance at this location.

## 4.0 Methodology

The basic objective for this detailed impact assessment study was to evaluate potential heritage resource areas that might be in conflict with the proposed construction of the Keenleyside Generation project. Three areas have been identified as being in possible conflict (Simonsen, 1982). These are; 1. Powerplant location; 2. Construction camp location; and 3. Concrete Aggregate Borrow areas (Figure 1.2).

The preliminary overview study did not locate specific heritage resources, but sites DiQk 1, DiQk 3 and DiQk 4 had been recorded in the proposed project area in 1961 (Harrison, 1961). These sites were not relocated during preliminary overview work, nor were they manifest during the detailed impact assessment.

Shovel testing and systematic evaluative testing was conducted at the powerplant location, the construction camp location and at the proposed concrete aggregate borrow area location. Survey of the impervious till borrow area locations consisted of a thorough search for possible pictrograph sites or any other evidence of previous land use.

At all locations where evaluative testing was conducted, the testing was done using standard excavation and recording procedures. Shovels and trowels were used depending on circumstances, all matrix was screened through 5.0 mm mesh. Test units consisted of 50 cm x 50 cm squares taken to a depth of at least 50 cm below surface. These test units were established along arbitrary grid lines spaced 5 m, 10 m or 20 m apart depending on the size of the potential heritage site area.

## 4.0 Methodology

The basic objective for this detailed impact assessment study was to evaluate potential heritage resource areas that might be in conflict with the proposed construction of the Keenleyside Generation project. Three areas have been identified as being in possible conflict (Simonsen, 1982). These are; 1. Powerplant location; 2. Construction camp location; and 3. Concrete Aggregate Borrow areas (Figure 1-2).

The preliminary overview study did not locate specific heritage resources, but sites DiQk 1, DiQk 3 and DiQk 4 had been recorded in the proposed project area in 1961 (Harrison, 1961). These sites were not relocated during preliminary overview work, nor were they manifest during the detailed impact assessment.

Shovel testing and systematic evaluative testing was conducted at the powerplant location, the construction camp location and at the proposed concrete aggregate borrow area location. Survey of the impervious till borrow area locations consisted of a thorough search for possible pictrograph sites or any other evidence of previous land use.

At all locations where evaluative testing was conducted, the testing was done using standard excavation and recording procedures. Shovels and trowels were used depending on circumstances, all matrix was screened through 5.0 mm mesh. Test units consisted of 50 cm x 50 cm squares taken to a depth of at least 50 cm below surface. These test units were established along arbitrary grid lines spaced 5 m, 10 m or 20 m apart depending on the size of the potential heritage site area.

## 5.0 Resource Evaluation

Evaluative testing at three potential heritage site locations in the Keenleyside Generation Project area did not yield evidence of heritage sites. The reasons for negative results at these locations may be:

1. The test sample was too small;
2. Heritage sites have been obliterated by previous construction activity;
3. No heritage sites ever occurred at these locations.

A combination of the three reasons given above may offer an explanation for negative results. Certainly previous construction activity has modified the land surface in the proposed camp location, recent log yard activities have modified the land surface in the aggregate borrow areas. The sub-surface grid testing and shovel testing samples were small, but sufficient to encounter significant heritage resources if such were present.

## 6.0 Impact Identification and Assessment

The proposed Keenleyside Generation Project is not expected to adversely effect any heritage resources, as none have been encountered in the immediate vicinity of the proposed project.

If heritage sites had been identified, the expected impacts would be as a result of construction activity related to the proposed project. Considerable land modification can be expected to occur with the construction of labour camps, extraction of concrete aggregate material and impervious till material. Installation of the generation plant would also mean major construction activity in the project area.

## 6.1 Schedule of Proposed Construction Activities

The tentative schedule for the proposed Keenleyside Generation Project shows a possible start date for construction activities to be spring of 1984 (B.C. Hydro, 1982).

Construction facilities, Highway relocation and cofferdam construction activities are scheduled to begin in the spring of 1984.

Channel and powerhouse excavation and eartnwork are scheduled to begin in the summer of 1984. Powerplant construction is to take place in the spring of 1986. The borrow activities related to this construction can be expected to begin in spring or summer of 1984 (B.C. Hydro, 1982).

## 7.0 Discussion of Research

This detailed heritage impact assessment study of the proposed Keenleyside Generation Project area focused on five main activity loci. As identified in the preliminary overview these are:

1. Powerplant Location
2. Construction Camp Area
3. Concrete Aggregate Borrow Area
4. Balfour Borrow Area No. 1
5. Balfour Borrow Area No. 2 (Simonsen, 1982)

No heritage resources were identified as a result of the preliminary overview work done in the proposed Keenleyside Generation Project area. Heritage resource potential was considered to be high at the proposed Powerplant Location, Construction Camp Area, and Balfour Borrow Area No. 1 (Simonsen, 1982). Further survey, evaluative testing and shovel testing during the course of detailed impact assessment evaluation at all five locations failed to identify any heritage resources in the Keenleyside Generation Project area.

## 7.1 Suitability and Reliability of Testing Program

All potential heritage resource areas and all proposed construction loci in the Keenleyside Generation Project area received the same level of evaluative testing as was conducted at heritage sites in the proposed Murphy Creek Project area.

The same methods and techniques that were employed to identify and evaluate heritage resources in the proposed Murphy Creek Project area were used at potential heritage resource areas in proximity to the proposed Keenleyside Generation Project. The procedures employed proved to be suitable and reliable in the Murphy Creek Project area and can be so considered for the Keenleyside Generation Project area.

## 8.0 Recommendations

Compensation for loss of heritage values is not a consideration at this time as no heritage resources have been identified in the proposed Keenleyside Generation Project area.

Mitigation procedures or project modifications are not necessary for the proposed Keenleyside Generation Project for the same reason as above.

As the proposed project entails considerable land alteration activities, some form of monitoring of these activities is recommended. Consultation with the Heritage Conservation Branch prior to the start of construction activities is recommended to establish what form the monitoring procedures should take.

It is now recommended that initial monitoring be done immediately construction starts at:

1. The Powerplant Location
2. The Construction Camp Area
3. The Concrete Aggregate Borrow Area

Further monitoring might be done on a periodic basis at these locations to the satisfaction of the Heritage Conservation Branch and B.C. Hydro and Power Authority.

No further or other heritage work is recommended or required in the proposed Keenleyside Generation Project area.

## 9.0 References Cited


Baker, James
1981 Murphy Creek Project, Heritage Resources Study - Stage I. *Report prepared for B.C. Hydro*

Baker, James
1983 Murphy Creek Project Heritage Resource Detailed Impact Assessment. *Report prepared for B.C. Hydro*

B.C. Hydro
1982 Keenleyside Powerplant Project Preliminary Engineering Description. *Hydroelectric Generation Projects Division, Report No. H1545*

Harrison, Peter
1961 Report of the Archaeological Survey of the High Arrow Reservoir. *Heritage Conservation Branch, Ms 1961/5*

Simonsen, Bjorn
1982 Heritage Resource Overview Study; Proposed Keenleyside Generation Project. *B.C. Hydro Socio-Economics Services Report No. ESS-49*

Turnbull, C. J.
1977 Archaeology and Ethnohistory in the Arrow Lakes, Southeastern British Columbia. *National Museum of Man, Mercury Series, Archaeological Survey of Canada*, Paper No. 65. Ottawa.